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(12) **United States Patent**  
**Petter**

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(54) **MULTIPHASE POWER CONVERTERS AND MULTIPHASE POWER CONVERTING METHODS**

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(21) Appl. No.: **11/850,103**

(22) Filed: **Sep. 5, 2007**

(65) **Prior Publication Data**

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**Related U.S. Application Data**

(60) Provisional application No. 60/842,762, filed on Sep. 6, 2006.

(51) **Int. Cl.**  
**H02H 7/122** (2006.01)

(52) **U.S. Cl.** ..... **363/56; 363/131**

(58) **Field of Classification Search** ..... **323/272, 323/283, 361, 56, 132, 131**

See application file for complete search history.

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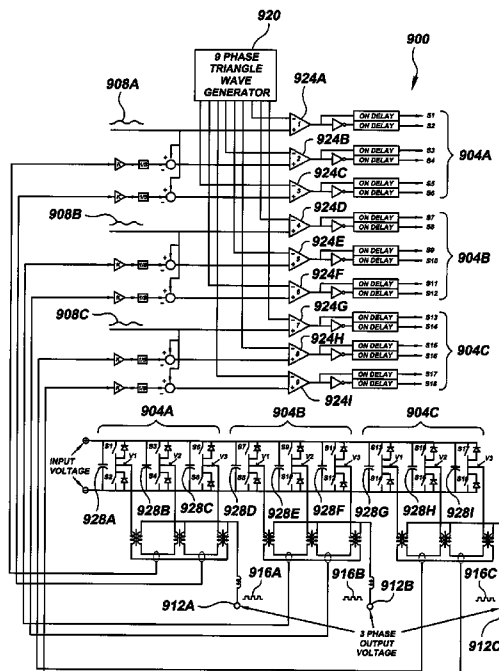
*Primary Examiner*—Shawn Riley

(74) *Attorney, Agent, or Firm*—Downs Rachlin Martin PLLC

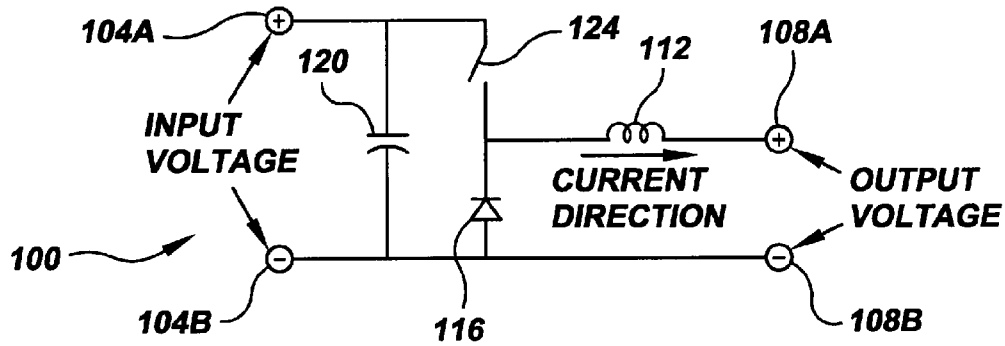
(57) **ABSTRACT**

A new class of multiphase converters having at least two switching cells driven by out-of-phase PWM reference signals and corresponding respective PWM control signal signals. In some embodiments, once of the switching cells are driven as a function current-balancing feedback so as to balance the currents between the switching cells. Various embodiments of the multiphase converter include one or more unique transformers for averaging the output of the switching cells.

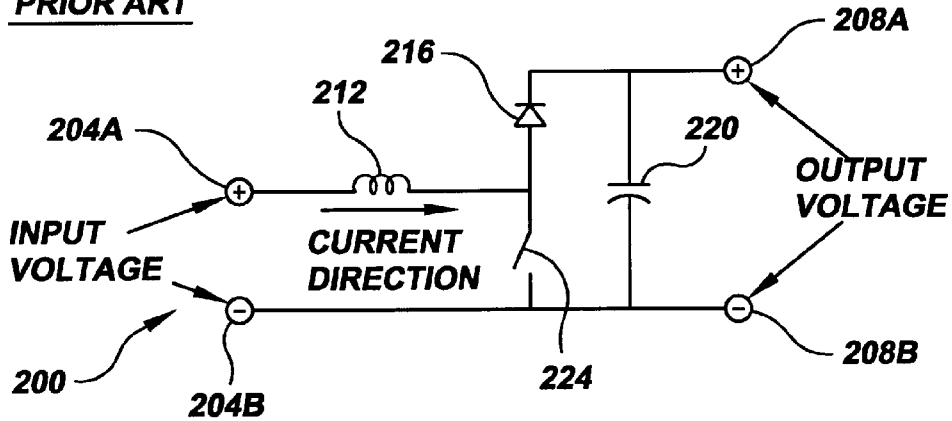
**27 Claims, 10 Drawing Sheets**



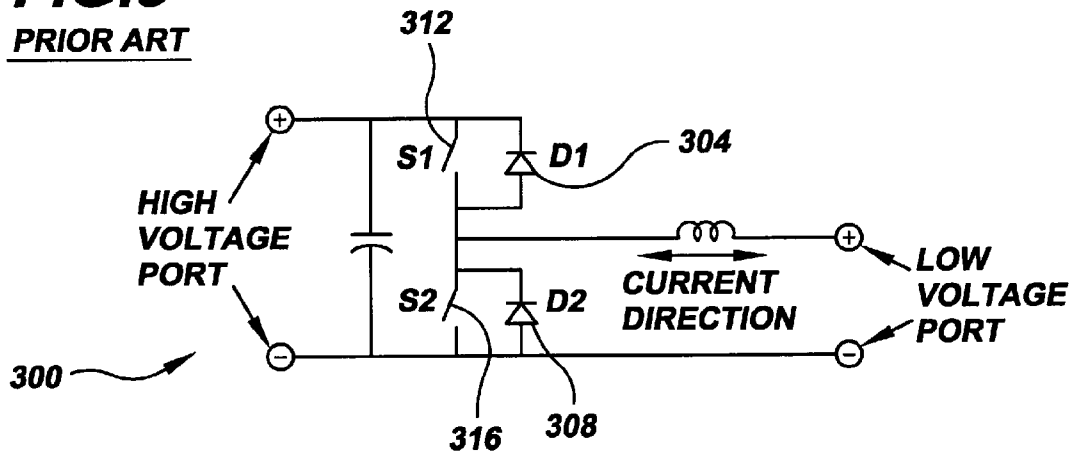
**FIG. 1**  
**PRIOR ART**



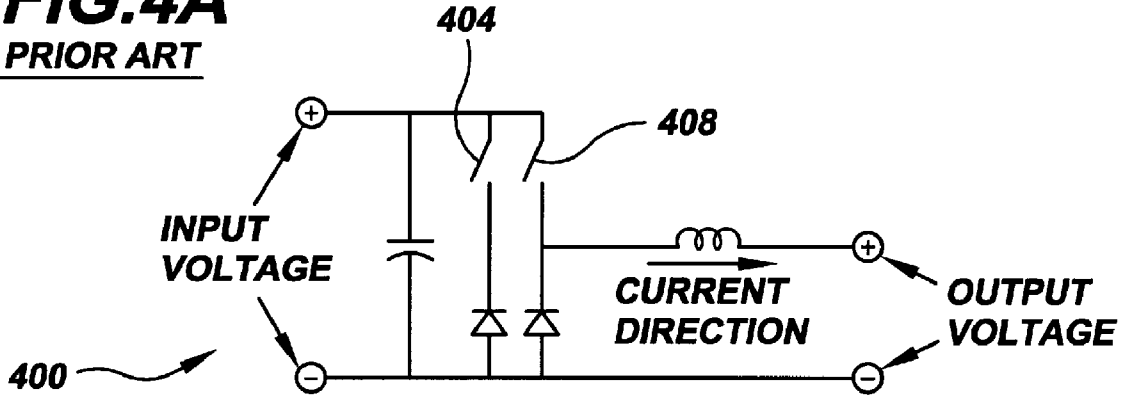
**FIG. 2**  
**PRIOR ART**



**FIG. 3**  
**PRIOR ART**



**FIG.4A**  
**PRIOR ART**



**FIG.4B**  
**PRIOR ART**

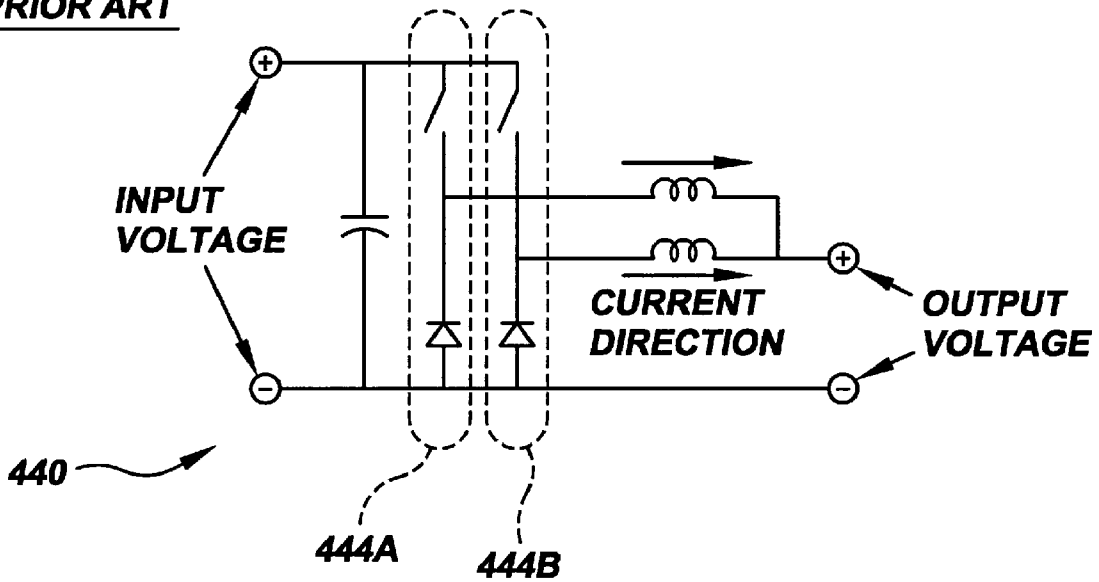


FIG. 5A

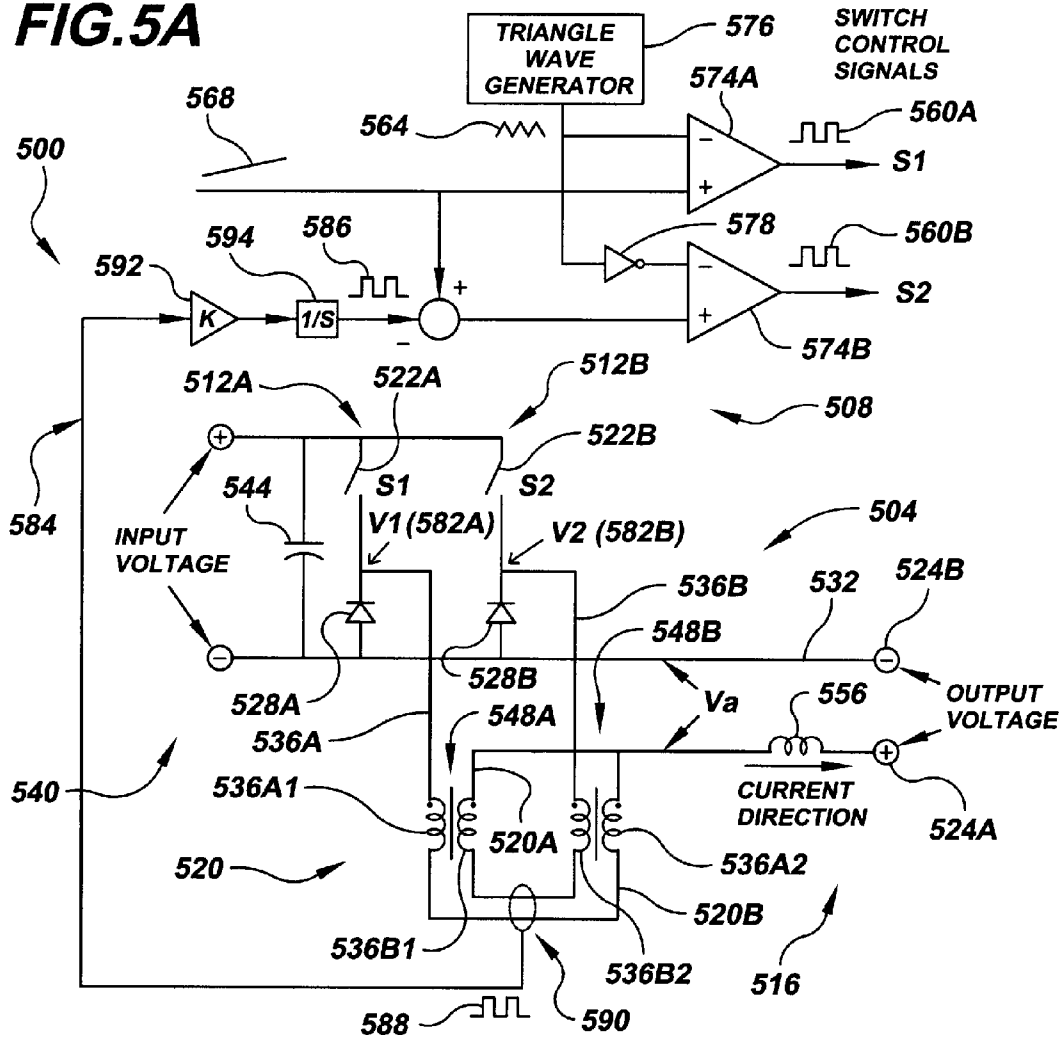


FIG. 5B

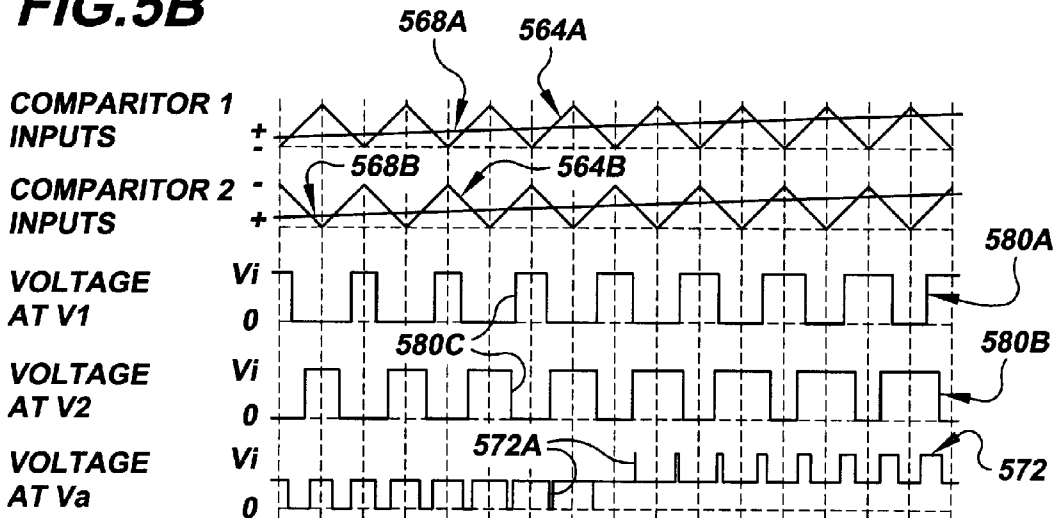


FIG. 6A

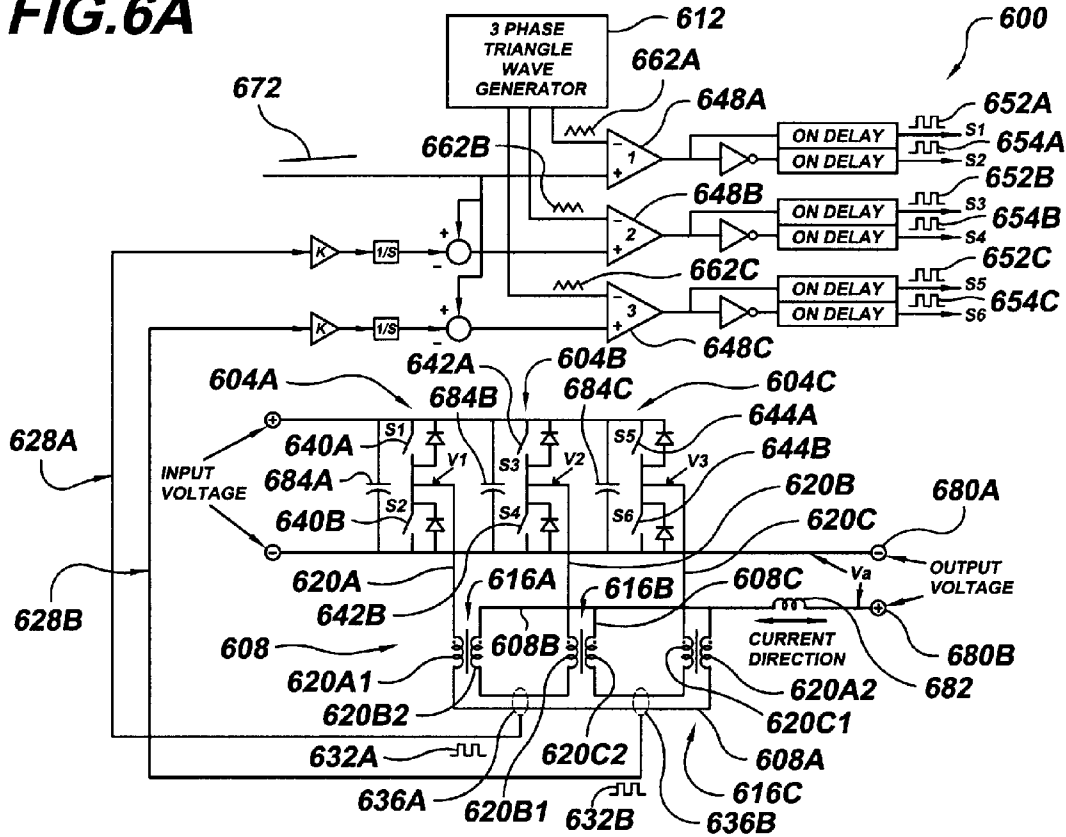
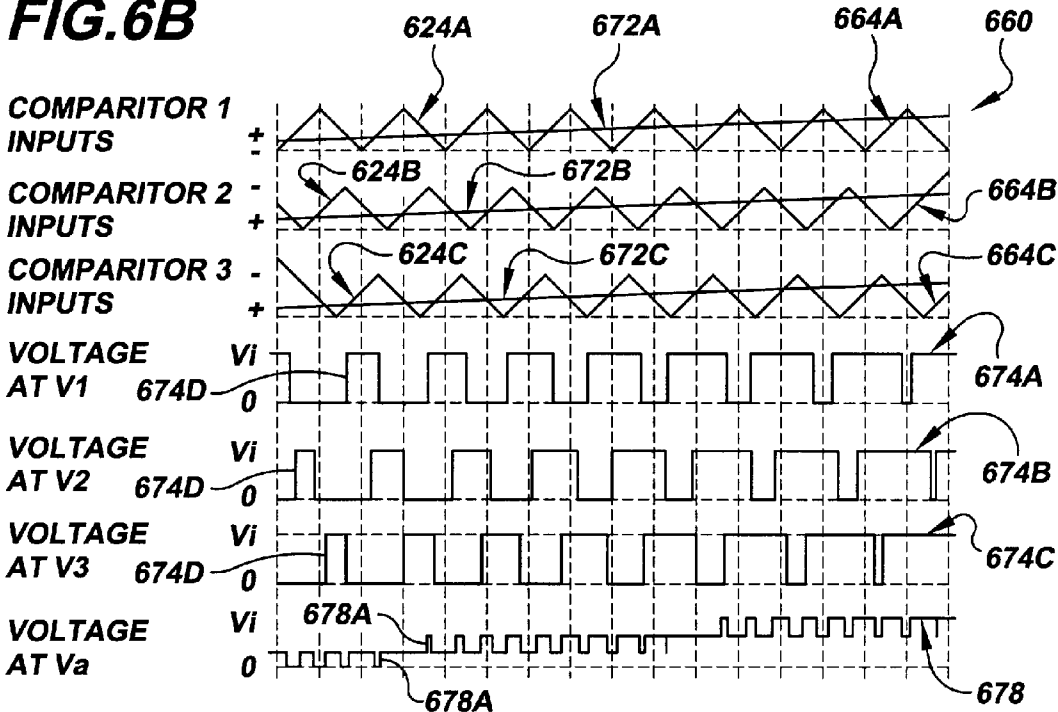


FIG. 6B



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